

B.TECH SEM – VI (2007 COURSE) (ELECTRICAL ENGG.) :

SUMMER - 2018

SUBJECT: POWER SYSTEM ANALYSIS

Day: **Wednesday**
Date: **06/06/2018**

S-2018-2716

Time: **02.30 PM TO 05.30 PM**
Max Marks: 80

N.B:

- 1) **Q.No.1** and **Q.No.5** are **COMPULSORY**. Out of the remaining questions attempt **ANY TWO** questions from each section.
- 2) Answers to both the sections should be written in the **SEPARATE** answer books.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Figures to the right indicate **FULL** marks.
- 5) Assume suitable data if necessary.

SECTION – I

- Q.1** a) Discuss the various methods of voltage control applied on the power system. [05]
b) Explain significance of single line diagram in analysis of power system. [05]
c) Write short note on formation of power flow equations. [04]
- Q.2** a) Derive expression for complex power flow over transmission line and enlist the parameters of line controlling the active and reactive power. [07]
b) Explain with the help of block diagram, the P–f and Q – V dependency. [06]
- Q.3** a) A three- phase synchronous generator delivers 10 MVA at a voltage of 10.5KV. The line impedance is 5Ω . Determine the voltage drop in the line in per unit and in volts. Use the reference base as 12MVA at 11 KV.. [07]
b) Prove that per unit quantities remains same for 1 ϕ and 3 ϕ circuit. [06]
- Q.4** a) Show that diagonal elements of a Y-bus matrix is equal to the sum of admittances directly connected to that bus and an off-diagonal element is equal to the negative sum of admittances directly connected between that buses. [07]
b) Compare Gauss-Seidal method and Newton-Raphson method for load flow solution. [06]

SECTION – II

- Q.5** a) Write short note on selection of circuit breakers and current limiting reactors. [05]
b) List out and explain different kinds of symmetrical and unsymmetrical faults. [05]
c) Define stability. What are the factors affecting transient stability? [04]

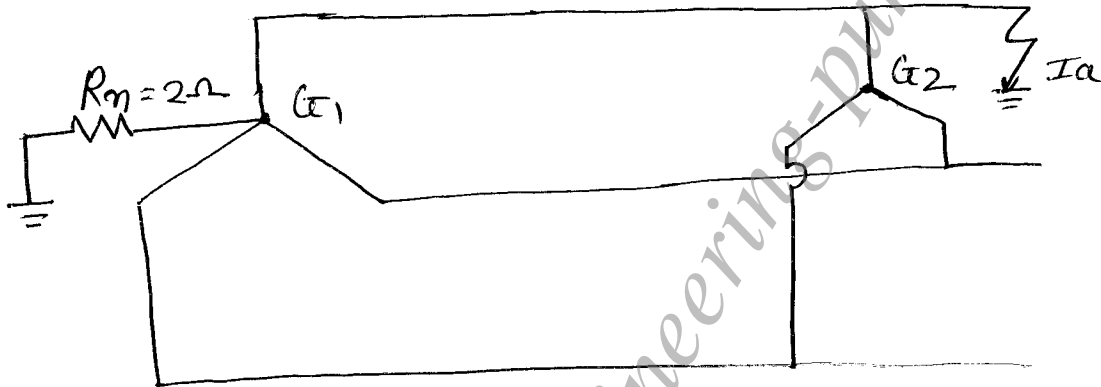
P.T.O.

Q.6 a) Find the value in ohms of the reactance per phase external to a 20MVA, 10 KV, 50Hz, 3-phase generator such that the steady state current on short circuit shall not exceed 8 times the full-load current. The internal reactance of the generator is 5%. [07]

b) Sketch and explain the equivalent circuit of unloaded 3 phase alternator during sub-transient, transient and steady state operations. [06]

Q.7 a) Two 11 KV, 25 MVA, 3-phase, star connected generators generate in parallel as shown in figure. The positive, negative and zero sequence reactances of each being respectively $j0.18$, $j0.15$, $j0.10$ pu. The star point of one of the generators is isolated and that of the other is earthed through a 2.0 ohm resistor. A single line-to-ground fault occurs at the terminals of one of the generators. Estimate: [07]

- i) The fault current
- ii) Current in grounding resistor
- iii) The voltage across grounding resistor



b) Draw and explain connection of sequence network for : [06]
 i) L – G fault ii) L – L fault.

Q.8 a) Explain equal area criteria for stability studies for one-machine infinite bus problem. [07]

b) Estimate the steady state stability limit of a synchronous generator and state the measures to increase the same. [06]

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